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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/832,885	04/12/2001	Naoki Tsukiji	199894US-8	1390

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EXAMINER	
MONDT, JOHANNES P	
ART UNIT	**PAPER NUMBER**
2826	

DATE MAILED: 05/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/832,885	TSUKIJI ET AL.	
	Examiner	Art Unit	
	Johannes P Mondt	2826	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2003 and 15 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-82* is/are pending in the application.

4a) Of the above claim(s) *7-35,42-64 and 70-82* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,36-41 and 65-69* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/17/03*.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *4/16/4,4/19/4* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The examiner has considered the items listed on the Information Disclosure Statement filed 11/17/03. A signed copy of Form PTO-1449 is enclosed with this Official Action.

Response to Amendment

Amendment filed 1/15/04 forms the basis of this Official Action. In addition examiner acknowledges the withdrawal of the Examiner's Amendment as approved by Applicant's Representative (see enclosed Interview Summary) based on a re-visited interpretation of the method of manufacturing the diffraction grating as described by Talneau et al as submitted in the Information Disclosure Statement of 11/17/2003. With apologies the examiner therefore has to offer the following rejections.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. ***Claims 1, 4, 5, 36 and 39*** are rejected under 35 U.S.C. 102(b) as being anticipated by Talneau et al (Applied Physics Letters, Volume 75, No. 5 (1999), pp. 600-602) in view of Matsumoto (5,327,445). Talneau et al teach (cf. abstract, Figures 1-4 and pages 600-602) a semiconductor laser device comprising: an active layer (page 600, second column, third paragraph); and the diffraction grating positioned within the semiconductor laser device, with said diffraction grating located within the

semiconductor material (lines 13-15 of second paragraph of second column of page 600) and located on top of the upper confinement layer (page 600, third paragraph, second sentence); wherein said semiconductor laser device is configured to emit a light beam (inherent for semiconductor laser as for any other laser), said light having a plurality of longitudinal modes (cf. page 601, second paragraph, first sentence, and Figure 4) with a predetermined spectral width of an oscillation wavelength spectrum of the semiconductor laser device (said modes being 'selected'; see page 601, second paragraph, first sentence, and said 'spectral width' being determined (16 nm); see final sentence of second paragraph of page 601). (N.B. Note that since the diffraction grating is positioned both within the semiconductor layer and on top of the confinement layer it must be located in a layer above said confinement layer, said layer at least serving the purpose of providing additional space between said active layer and said diffraction grating. Therefore, said diffraction grating is positioned within a spacer layer within said semiconductor device).

On claims 4 and 39: the length of the resonant cavity in Talneau et al is 600 mm, which meets the limitations defined by claims 4 and 39 (see page 601, first column).

On claim 5: said diffraction grating in Talneau et al is formed substantially along an entire length of said active layer (cf. abstract).

On claim 36: mere operation of the semiconductor laser device of claim 1 meets the limitation of claim 36.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. ***Claims 1, 36-41 and 65-69*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Linke et al (6,363,097 B1) in view of Yoon et al (INSPEC Access No.: 6544626) and Talneau et al (Applied Physics Letters, Volume 75, No. 5, pp. 600-602).

Linke et al teach a semiconductor (FP) (cf. col. 4, l. 4, l. 41) laser device (cf. title) comprising: an active layer (active region in Figure 3) configured to radiate light; and a diffraction grating 11 (cf. col. 4, l. 27), wherein said semiconductor laser device is capable of emitting a light beam having a plurality of longitudinal modes within a predetermined spectral width of an oscillation wavelength spectrum of the semiconductor laser, inherently so because sufficiently close the gain threshold Fabry-Perot laser devices emit a plurality of longitudinal modes.

Linke et al do not necessarily teach the limitation that said semiconductor laser device to be actually *configured* to emit said plurality of longitudinal modes. However, it would have been obvious to include said limitation in view of Yoon et al who teach the use of multi-longitudinal Fabry-Perot laser diodes in optical communication systems for the advantage of low cost (cf. abstract). *Motivation* to include the teaching by Yoon et al

in the invention by Linke et al stems from the possibility to apply the device by Linke et al to optical communications to achieve cost advantage in an obvious application of said device. Combination of said teaching and said invention is readily achieved by applying the device in a power setting that is sufficiently moderately above threshold. Success in implementing the combination can therefore be reasonably expected.

Linke et al do not necessarily teach the further limitation that said diffraction grating is to be positioned within the semiconductor laser device. However, it would have been obvious to include said further limitation in view of Talneau et al, who, in a patent drawn to a semiconductor laser device with multiple longitudinal modes simultaneously emitted by the laser beam (see abstract), teach that the diffraction grating can be positioned within the semiconductor device using wet etching so as to produce a linear rather than (an undesirable non-linear) diffraction grating. *Motivation* to include the teaching by Talneau et al is the advantage of uniform output of the simultaneous lasing modes (cf. abstract) rather than the single-mode laser by Linke et al.

On claim 36: mere operation of the semiconductor laser device of claim 1 meets the limitation of claim 36.

On claim 37: in view of the well-known linear relation between the length of the resonant cavity and the interval between the frequency (inversely with wavelength) in a multi-longitudinal mode laser as given in text books such as “Principles of Lasers” by Svelto et al (see Form 892), it is inevitable that the setting of the length of the resonant cavity provides the wavelength interval between said plurality of longitudinal modes.

On claims 38-41: as the length of the resonant cavity in Talneau et al influences the length of the wavelength interval and thus must have been set such that the wavelength interval between said plurality of longitudinal modes is at least 0.1 nm (cf. Figures 1b, 2 and 4) which meets claim 38. Motivation to include this limitation met by Talneau et al in the device by Linke et al derives from the requirements in the application to wavelength division multiplexing (see page 600, first paragraph, first sentences) to which the laser device by Linke et al equally could be applied and hence is a matter of design choice. To achieve said design choice the cavity length in Talneau is set to 600 μm (cf. page 601, first column), which meets claim 39. As witnessed by Figures 1b, 2 and 4, evidently the length of the resonant cavity was set such as to provide said plurality of longitudinal modes within said predetermined spectral interval width of the oscillation spectrum, and hence claim 40 is also met. Although neither Linke et al nor Yoon et al nor Talneau et al specifically teach the range implied by the limitation defined by claim 41, nothing in Applicant's Specification clarifies why the difference between the claimed 800 μm and the value of 600 μm in the prior art offered by Talneau et al is critical to his invention. Applicant is reminded that it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

On claim 65: said means for radiating light within said semiconductor laser device is met by said active layer in Linke et al; said means for selecting a portion of said radiated light to be emitted by said semiconductor laser device as an output light

beam is met by the diffraction grating; said means for ensuring said output light beam has an oscillation wavelength spectrum with a plurality of longitudinal modes located at predetermined spectral width is met by the length of the resonant cavity.

On claim 66: the wavelength interval is automatically set by, selection of the length of the resonant cavity, as discussed above. Hence said means for ensuring comprises the means for setting said wavelength interval.

On claim 67: as the length of the resonant cavity i.e., said means for setting a wavelength interval, inherently influences the length of the wavelength interval and thus must have been set such that the wavelength interval between said plurality of longitudinal modes is at least 0.1 nm (cf. Figures 1b, 2 and 4) in the invention by Linke et al, Yoon and Talneau et al claim 67 is met.

On claim 68: as the length of the cavity inherently influences the spectral width of the oscillation spectrum said means of ensuring meets claim 68.

On claim 69: said means for setting the predetermined spectral width of said oscillation wavelength spectrum in the invention by Linke, Yoon et al and Talneau et al evidently meets the limitation of claim 69, because the spectral width in Figure 1a in Talneau et al is less than 3 nm.

1. ***Claims 2-4*** are rejected under 35 U.S.C. 103(a) as being unpatentable over Linke et al in view of Yoon et al and Talneau et al as applied to claim 1 above, and further in view of Menna et al as provided by Applicant in the Information Disclosure Statement ("High-Power 1550 nm Distributed Feedback Lasers with 440 mW CW

Output Power for Telecommunication Applications"). Although neither Linke et al nor Yoon et al nor Talneau et al necessarily teach the further limitation as defined by claim 2 it is obvious that the directionality of the output beam 14 as taught by Linke et al (cf. col. 4, l. 12-16) can only be brought about when the vertical side of the active region on the output side reflects sufficiently little while the other vertical side of the active region reflects sufficiently. As is understood in the art and taught in Menna et al, it is common in semiconductor lasers to provide a highly reflective coating on one side and an antireflective coating on the other side of active regions to achieve directional lasing (cf. page 1). *The motivation* for including the teaching by Menna et al in the invention by Linke et al and Yoon et al stems from the beneficial if not necessary aspect of said highly reflective and antireflective coatings to achieve lasing with directional output. Combination of said teaching with said invention is easily achieved by provided an antireflective coating at the end of the active region near the output nozzle 14 and a highly reflective coating at the other end. Success in implementing the combination can therefore be reasonably expected. Inherently, the resonant cavity is thus defined through said highly reflective and anti-reflective coatings.

On claim 3: Although neither Linke et al nor Yoon et al nor Talneau et al specifically teach the range implied by the limitation defined by claim 3, nothing in Applicant's Specification clarifies why the difference between the claimed 800 μm and the value of 600 μm in the prior art offered by Talneau et al is critical to his invention. Applicant is reminded that it has been held that where the general conditions of a claim

are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

On claim 4: said length of said resonant cavity as taught by Talneau et al to achieve the desired spectral conditions is not greater than 3200 μm, namely: 600 μm, and hence meets the claim.

Allowable Subject Matter

4. ***Claim 6*** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: Talneau et al only achieve multi-mode output through a spatial frequency in the diffraction grating (see page 601, first paragraph).

Response to Arguments

5. Applicant's arguments filed 1/15/04 have been fully considered but they are not persuasive. Applicant's Information Disclosure Statement of 11/17/03 contains pertinent prior art in the form of Talneau et al, as evidenced by the rejections made above. Ample motivation exists to adapt the laser device by Linke et al according to the teaching by Talneau et al to achieve multi-mode lasing, considering the applications to wavelength division multiplexing as explained by Talneau et al (page 600, first column), while claims 1, 4, 5 and 36 are anticipated by Talneau et al. Examiner thanks Applicant for accepting a proposed examiner's amendment; however, in view of a correct reading, in particular the placing of said diffraction grating within a layer within the semiconductor device and

positioned above the confinement layer the proposed examiner's amendment regretfully had to be withdrawn, with apologies from the examiner.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Johannes P Mondt whose telephone number is 571-272-1919. The examiner can normally be reached on 8:00 - 18:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan J Flynn can be reached on 571-272-1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JPM
April 17, 2004

Minhloan Tran
Primary Examiner
Art Unit 2826